

Claims

1. Bending machine comprising receiving, delivering, and bending units for profiles and circular pipes that are to be bent, characterized in that the bending head (1) of the bending machine essentially comprises a sequential arrangement of at least one pair of support rolls (18), followed by at least one pair of rolling rolls (17), followed by at least one bending roll (14), wherein the bending roll (14) is arranged in a fixed manner on a rotary disk (12), the turning center of which is aligned parallel to the longitudinal axis of the profile (5) that is to be bent, and that the rotary disk (12) itself is part of a coordinate table which is movable in at least two directions that are perpendicular to each other and which can be adjusted according to the bending requirements for the profile (5).
2. Bending machine according to claim 1, characterized in that the rotary disk (12) can be rotated in a circle without interference by means of a drive (13).
3. Bending machine according to claim 1 or 2, characterized in that the coordinate table consists of two coordinate plates (10, 11) adjustable at right angles relative to each other in one plane.
4. Bending machine according to claim 1, 2 or 3, characterized in that the coordinate plates (10,11) can be moved by means of displacement drives (16, 26).
5. Bending machine according to one of claims 1 through 4, characterized in that the pair of rolling rolls (17) and/or the pair of support rolls (18) is adjustable toward or away from the profile (5) by means of adjustment drives (19, 20).

6. Bending machine according to one of claims 1 through 5, characterized in that the pair of rolling rolls (17) and/or the pair of support rolls (18) can be moved in the direction toward or away from the bending roll (14).
7. Bending machine according to one of claims 1 through 6, characterized in that only the upper or lower rolls of the pair of rolling rolls (17) and/or the pair of support rolls (18) can be moved in the direction toward or away from the bending roll (14).
8. Bending machine according to one of claims 1 through 7, characterized in that the to and fro movement of the pairs of rolling and/or support rolls (17, 18) takes place via a displacement guide (32) of a bracket (27) by means of adjustment drives (19, 20), that act in each case on corresponding freely pivotable ends of associated levers (33, 36).
9. Bending machine according to one of claims 1 through 8, characterized in that the respective lever (33, 36) is mounted with an eccentric bearing (40) on the walls of the bracket (27), whereas the respective rotary bearing (37, 48) is associated in each case with the free pivotable end of the lever (33, 36).
10. Bending machine according to one of claims 1 through 9, characterized in that the adjustment of the pairs of rolls (17, 18) takes place via a passive lower bracket (41) for the mounting of the lower rolls (17, 18) and an actively driven upper bracket (42) opposing it.
11. Bending machine according to claim 10, characterized in that the lower bracket (41) for the mounting of the lower rolls (17, 18) and is also actively driven [sic].

12. Bending machine according to one of claims 10 or 11, characterized in that the bracket (42) is held movably in a displacement guide (32) on the web plate (9) via a piston cylinder arrangement with a cylinder (43), wherein the piston rod of the cylinder (43) acts via a plate (46) on a shoe (44), that accommodates the rotary axis (37, 38) for the rolls (17, 18).
13. Bending machine according to one of claims 10 through 12, characterized in that the rotary axis (48) is fixedly anchored on one end of the shoe (44), whereas the opposite end of the shoe (44) is designed pivotable in the direction of the arrow (47).
14. Bending machine according to one of claims 1 through 13, characterized in that one or a plurality of pairs of rolls in the bending head (1) are rotatably driven such that they advance the profile (5) through their rotary movement in the longitudinal direction.
15. Bending machine according to one of claims 1 through 14, characterized in that the profile (5) that is to be bent are [sic] pushed through the bending head (1) via a slide carriage (4).
16. Bending machine according to one of claims 1 through 15, characterized in that a mandrel station (3) is provided on the rear portion of the bridge (2) of the bending machine for the mounting of a mandrel rod (21).
17. Bending machine according to one of claims 1 through 16, characterized in that the mandrel rod (21) passes through the profile (5) that is to be bent and a mandrel shank (22) is arranged in the interior of the profile (5), which is always held in the bending region by the drive of the mandrel station.

18. Bending machine according to one of claims 1 through 17, characterized in that a flow process is induced by the rolling rolls (17) on the outside of the profile in the external bending region.
19. Bending machine according to one of claims 1 through 18, characterized in that the moment of resistance of the profile is reduced by the flow process, as a result of which only greatly reduced bending forces are required for the bending process.
20. Bending machine according to one of claims 1 through 19, characterized in that the bending process for the profile that is to be bent takes place in a single pass.
21. Bending machine according to one of claims 1 through 20, characterized in that through the rolling out and the flow process of induced thereby, a ratio of profile size or diameter to the inside radius of the profile that is to be bent of 1.5 to 1 through 1 to 1 is possible.
22. Bending machine according to one of claims 1 through 21, characterized in that the bending process for the profile that is to be bent is determined by the synchronized use of a bending roll (14) and rolling rolls (17).